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Gallstone disease in patients with non-alcoholic fatty liver disease: metabolic risks

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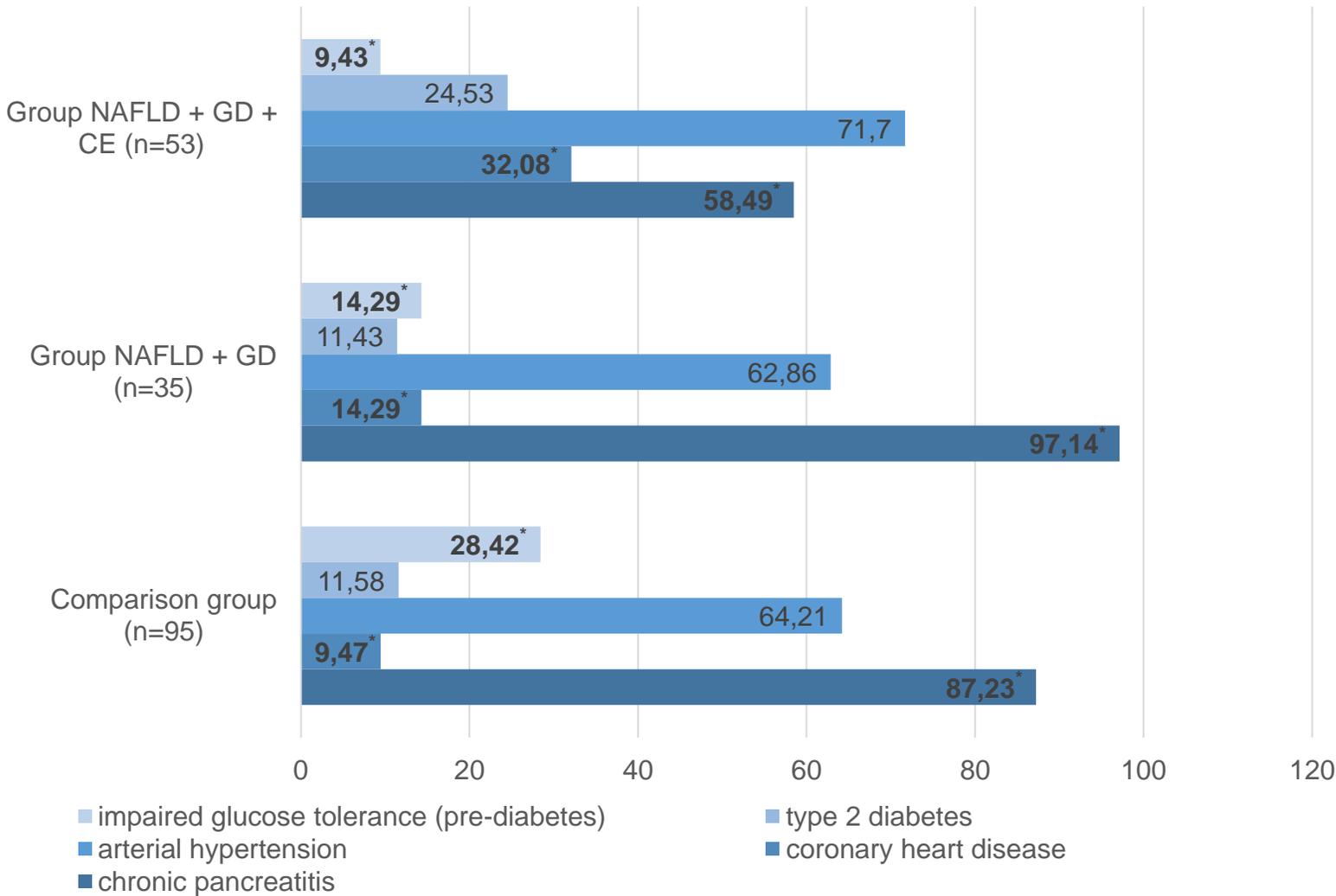
Summary Slide

Background. Non-alcoholic fatty liver disease (NAFLD) and gallstone disease (GD) are widespread throughout societies worldwide. Moreover, there is a high percentage of NAFLD and GD combination cases. It remains unclear whether NAFLD is a precursor to GD or if GD reveals signs of a metabolic syndrome that accelerates the progression of NAFLD.

Aim. To assess metabolic risks of patients with NAFLD with/without GD to improve the quality of management and treatment.

Methods. A total of 183 patients with NAFLD were included in this *case control study*. The main group was represented by patients with NAFLD and GD (n = 88), of which 53 underwent cholecystectomy (CE). The comparison group was represented by patients with NAFLD without GD (n = 95). All patients underwent standard laboratory testing to assess level of related hormones (i.e. leptin, its soluble receptor, adiponectin, and insulin) and instrumental examinations to assess fatty liver and stage of liver fibrosis (i.e. elastometry). Processing of research results was conducted with the Python programming language and the specialized data analysis libraries (NumPy and Pandas). Fuzzy logic and fuzzy rules were used to describe the relationship between risks and disease course.

Results

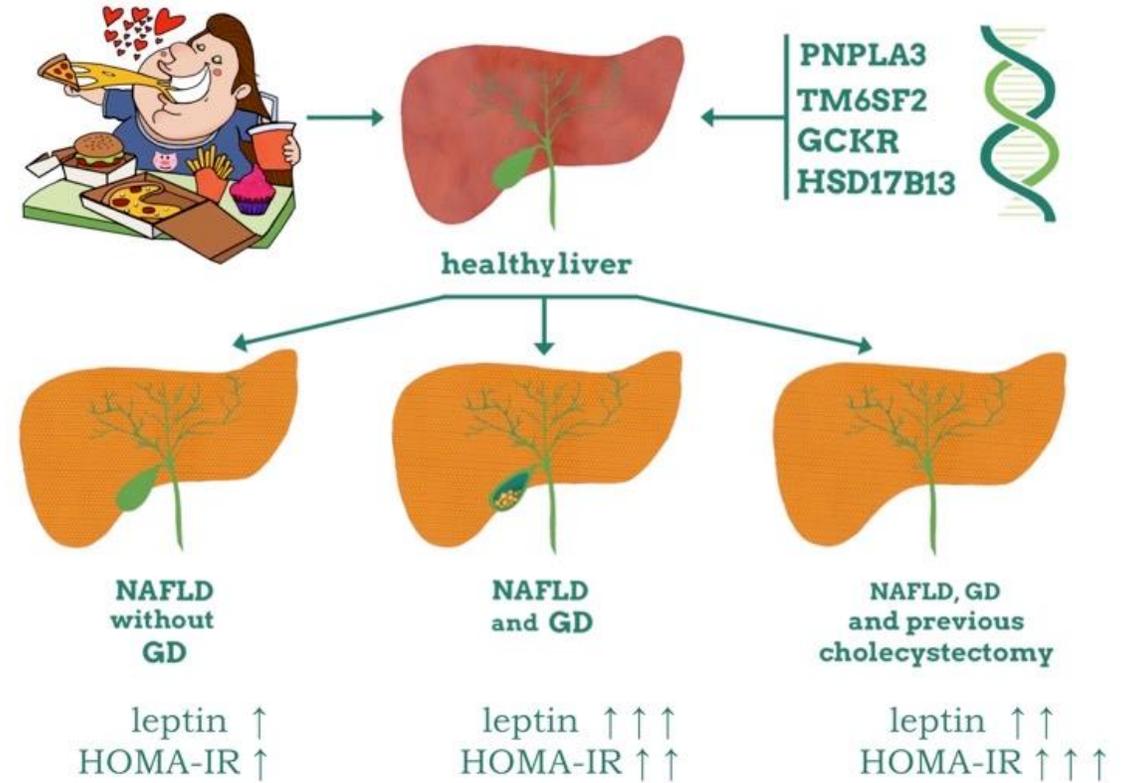
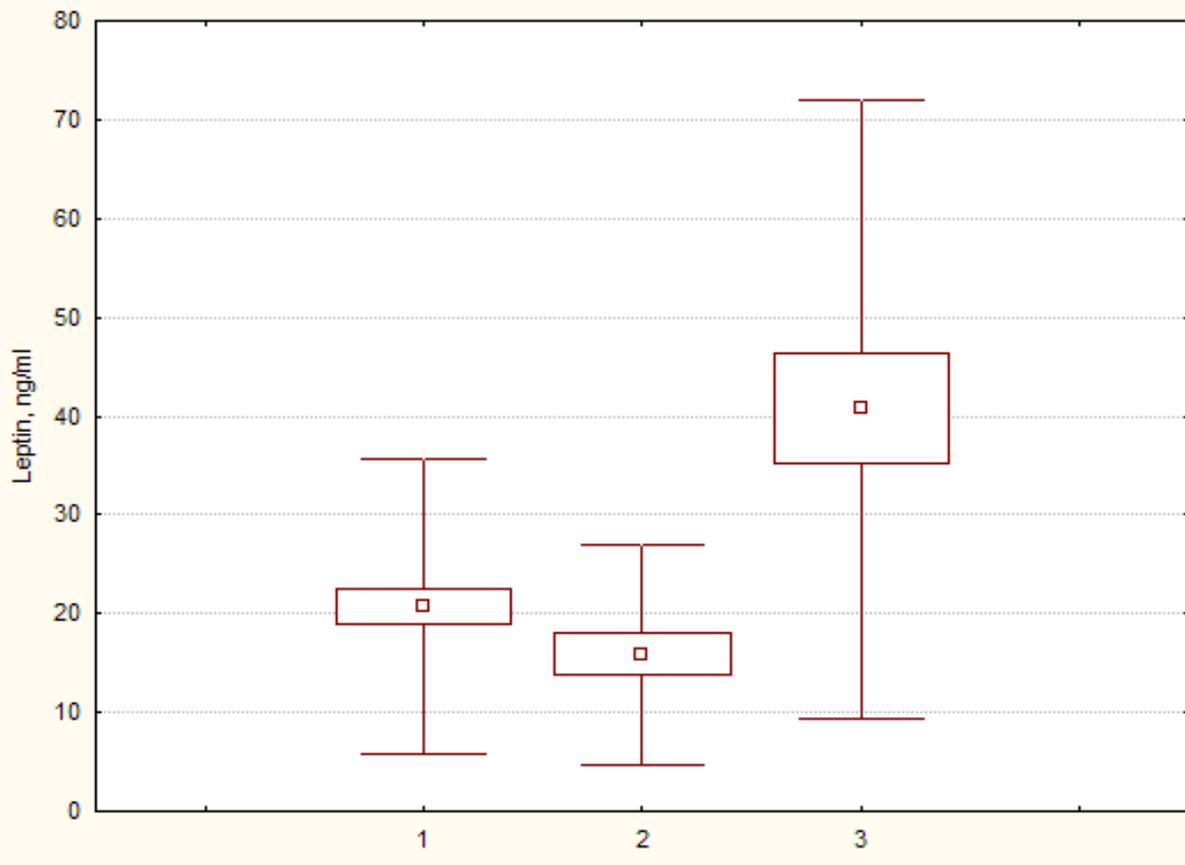


In the main group, **coronary heart disease** was diagnosed more often (25% in total for patients with GD, including CE, vs 9.47% in the comparison group), which was confirmed by a positive correlation finding ($r_s = 0.207$, $P \leq 0.01$ for GD and $r_s = 0.258$, $P \leq 0.01$ for CE). The combination of NAFLD and GD is associated with the development of **type 2 diabetes** ($r_s = 0.164$, $P \leq 0.01$), while the absence of GD is associated with pre-diabetes ($r_s = -0.212$, $P \leq 0.01$).

Prevalence of comorbidities among the various study groups. Data are shown as percentage.
 * $P \leq 0.01$ CE: Cholecystectomy; GD: Gallbladder disease; NAFLD: Non-alcoholic fatty liver disease.

Results

The overall patient population (all suffering from NAFLD) was characterized by hyperinsulinemia, insulin resistance, and hyperleptinemia, showing leptin resistance with a normal amount of adiponectin.

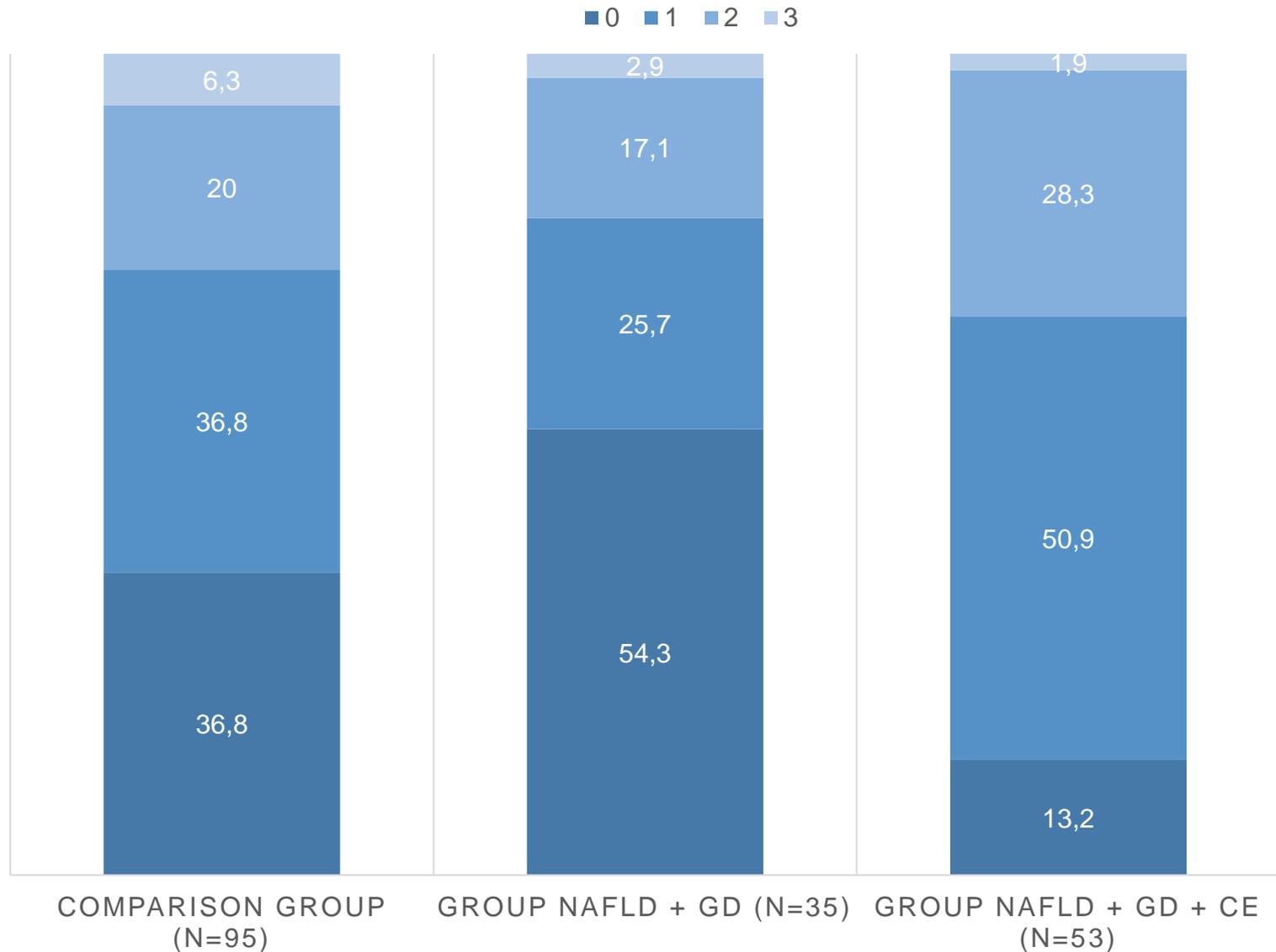


Level of leptin in comparative analysis of study groups. Group 1: Comparison group; Group 2: Non-alcoholic fatty liver disease (NAFLD) + gallbladder disease (GD); Group 3: NAFLD + GD + cholecystectomy (CE).

GCKR: Glucokinase regulator; GD: Gallstone disease; HOMA-IR: Homeostasis model assessment of insulin resistance; HSD17B13: 17 β -Hydroxysteroid dehydrogenase type 13; NAFLD: Non-alcoholic fatty liver disease; PNPLA3: Patatin-like phospholipase domain-containing protein 3; TM6SF2: Transmembrane 6 superfamily 2 human gene.

Results

The ratio of individuals with progressive stages of fibrosis (2 and 3) and non-progressive stages (1 and 2) or its absence depended on concomitant GD or CE. The main group had significantly more people with progressive stages of fibrosis than the comparison group (26.31% vs 20.45%), especially for patients who had undergone CE (30.18%). Liver fibrosis stage showed a positive significant correlation with CE ($r_s = 0.366$, $P \leq 0.01$).



Stages of fibrosis among the study groups, as determined by elastometry.

Conclusions

- Comorbid course of NAFLD and GD is characterized by clinical and laboratory features that may be associated with metabolic disorders, particularly imbalanced adipose tissue hormones.
- The phenomena of insulin and leptin resistance were detected in patients suffering from NAFLD and GD.
- Hyperleptinemia was observed in NAFLD patients with GD after CE.
- CE in patients suffering from GD and NAFLD was associated with progressive stages of liver fibrosis.

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Thank you!



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